CLAIMS

What is claimed is:

1. A multi-criteria fire detection system, comprising:

a plurality of sensors, wherein each said sensor is capable of detecting a signature characteristic of a presence of a fire and providing an output indicating same;

a processor for receiving each of said outputs of said plurality of sensors, said processor including a probabilistic neural network for processing said outputs, and wherein said probabilistic neural network comprises a nonlinear, non-parametric pattern recognition algorithm that operates by defining a probability density function for a plurality of data sets that are each based on a training set data and an optimized kernel width parameter, and wherein said plurality of data sets includes:

a baseline, non-fire, first data set;

a second, fire data set; and

a third, nuisance data set;

whereby said algorithm provides a decisional output indicative of the presence of a fire based on recognizing and discriminating between said data sets and whether said outputs suffice to substantially indicate the presence of a fire as opposed to a non-fire or nuisance situation.

2. A system as in claim 1, wherein said algorithm comprises just one such optimized kernel width parameter that along with one of said training set data defines said probability density function for each said data set.

3. A system as in claim 2, wherein said algorithm further comprises a cross-validation protocol.

4. A method for detecting the presence of a fire, comprising the steps of:

establishing a plurality of data sets, said data sets including:

a baseline, non-fire, first data set;

a second, fire data set; and

a third, nuisance data set;

training each of said data sets to respond to an input and provide a representative output;

sensing a plurality of signatures of a fire;

encoding each of said plurality of signatures in a numerical output representative of a point or location in a multidimensional space;

inputting each said numerical output to a probabilistic neural network that operates by defining a probability density function for each said data set based on said training set data and an optimized kernel width parameter; and

correlating said numerical outputs to a location in said multidimensional space to determine the presence or absence of a fire at said location.